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| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/090,965  | 03/04/2002  | Friedrich Scienc     | 5005.01US02         | 6415             |
| 63274 7590 09/03/2008<br>DARDI & ASSOCIATES, PLLC<br>220 S. 6TH ST.<br>SUITE 2000, U.S. BANK PLAZA<br>MINNEAPOLIS, MN 55402 |             |                      |                     |                  |
| EXAMINER  |             |                      |                     |                  |
| PAK, YONG D   |             |                      |                     |                  |
| ART UNIT  |             | PAPER NUMBER         |                     |                  |
| 1652  |             |                      |                     |                  |
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/090,965

**Applicant(s)**

SRIENC ET AL.

**Examiner**

YONG D. PAK

**Art Unit**

1652

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 11 June 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SI/02)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

The Appeal Brief filed on June 11, 2008 has been entered. In view of applicant's arguments, a new Non-Final Rejection is being issued.

Claims 1-13 are pending and are under consideration.

### ***Response to Arguments***

Applicant's arguments filed on June 11, 2008, have been fully considered and are deemed to be persuasive to overcome the rejection previously applied.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-13 remain rejected under 35 U.S.C. 103(a) as being unpatentable over Madison et al., Clemente et al., Visser et al., and Squires et al.

Claims 1-13 are drawn to a method of producing PHA in *S. cerevisiae* or *Kluyveromyces* by introducing polynucleotide encoding a PHA<sub>SCL</sub> or PHA<sub>MCL</sub> and a polynucleotide encoding an acetoacetyl-CoA reductase and/or a  $\beta$ -ketothiolase.

Madison et al. teach a method of producing PHA in *S. cerevisiae* by introducing DNA encoding an *A. eutrophus* PHA polymerase (page 44). Madison et al. teach that low levels of PHA was due to insufficient activity of the endogenous  $\beta$ -ketothiolase and acetoacetyl-CoA reductase and points to improving PHA yields in *S. cerevisiae* by increasing the activities of these two enzymes.

Further, Madison et al. teach other PHA<sub>SCL</sub> and PHA<sub>MCL</sub> that can be used in transgenic yeasts (pages 24-35) and that many different transgenic organisms can be used to produce PHA (page 44), such as a *Kluyveromyces*, which also belongs to the family of *Saccharomycetaceae* like *S. cerevisiae*.

The difference between the reference of Madison et al. and the instant invention is that the reference of Madison et al. does not teach a method of producing PHA anaerobically using a yeast transformed a single nucleic construct comprising at least two of  $\beta$ -ketothiolase, acetoacetyl CoA reductase or PHA<sub>SCL</sub> or PHA<sub>MCL</sub>.

However, expression of multiple heterologous genes in yeast is routine in the art. Also, making a single nucleic acid construct composed of more than one or two genes is also very routine in the art (Strategene catalog, cited in previous Office Action). For example, Clemente et al. (U.S. Patent No. 5,489,894 – form PTO-892) discloses a method of expressing three genes via a single nucleic acid construct (Columns 15-16). Johnston et al. discloses using divergent promoters to express more than one gene in *S. cerevisiae*.

It is well known in the art that *S. cerevisiae* is able to grow both aerobically and anaerobically (Visser et al. - cited previously on form PTO-892). It is also well established in the art that anaerobic microorganisms are usable in large-scale fermenters, where the ability to reproduce and to produce biological products in an environment lacking oxygen is perceived as an advantage. Squires et al. (US Patent No. 4,690,897 – form PTO-892) discloses that “one reason that the ability to exhibit anaerobic growth is an advantage is that costly aeration apparatus for the fermentation vats need not exist when anaerobic organisms are grown in the vats. Secondly, the possibility of contamination with aerobes is eliminated when an anaerobic environment is used. Thirdly, several anaerobic species are of special interest, both medically and commercially, for their abilities to produce chemicals of interest” (Column 1, lines 15-57).

Therefore, with the references of Madison et al., Clemente et al., Visser et al., and Squires et al. in hand, it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to alter the teachings of Madison et al.

by make a transforming *S. cerevisiae* with a single nucleic construct comprising at least two of  $\beta$ -ketothiolase, acetoacetyl CoA reductase or PHA<sub>SCL</sub> or PHA<sub>MCL</sub> and culturing said *S. cerevisiae* under anaerobic conditions. The motivation of expressing  $\beta$ -ketothiolase, acetoacetyl CoA reductase or PHA<sub>SCL</sub> or PHA<sub>MCL</sub> via a single nucleic acid construct is to control and increase activity of said enzymes to increase the yield of PHA. The motivation of producing polyhydroxyalkanoates under anaerobic conditions is to optimize the efficiency in producing PHAs. One of ordinary skill in the art would have had a reasonable expectation of success since Madison et al. teach that an increase in activity of  $\beta$ -ketothiolase and an acetoacetyl CoA- reductase in yeast transformed with PHA<sub>SCL</sub> or PHA<sub>MCL</sub> will increase the yield of PHA, Clemente et al. teaches expression of multiple genes, and Squires et al. discloses the advantages of culturing microorganisms under anaerobic conditions

Therefore, the above references render claims 1–13 *prima facie* obvious to one of ordinary skill in the art.

### ***Conclusion***

Claims 1-13 are rejected.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yong Pak whose telephone number is 571-272-0935. The examiner can normally be reached 6:30 A.M. to 5:00 P.M. Monday through Thursday.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nashaat Nashed can be reached on 571-272-0934. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 571-272-1600.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

/Yong D Pak/  
Primary Examiner, Art Unit 1652